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Long-Term Outcomes of Cognitive-Behavioral Therapy for Adolescent Body Dysmorphic Disorder

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Emerging evidence suggests that cognitive-behavioral therapy (CBT) is an efficacious treatment for adolescent body

dysmorphic disorder (BDD) in the short term, but longer-term outcomes remain unknown. The current study aimed to follow up a group of adolescents who had

originally participated in a randomized controlled trial of CBT for BDD to determine whether treatment gains were maintained. Twenty-six adolescents (mean age = 16.2, $SD = 1.6$) with a primary diagnosis of BDD received a course of developmentally tailored CBT and were followed up over 12 months. Participants were assessed at baseline, midtreatment, posttreatment, 2-, 6-, and 12-month follow-up. The primary outcome measure was the clinician-rated Yale-Brown Obsessive-Compulsive Scale Modified for BDD. Secondary outcomes included measures of insight, depression, quality of life, and global functioning. BDD symptoms decreased significantly from pre- to posttreatment and remained stable over the 12-month follow-up. At this time point, 50% of participants were classified as responders and 23% as remitters. Participants remained significantly improved on all secondary outcomes at 12-month follow-up. Neither baseline insight nor baseline depression predicted long-term outcomes. The positive effects of CBT appear to be durable up to 12-month follow-up. However, the majority of patients remained symptomatic and vulnerable to a range of risks at 12-month follow-up, indicating that longer-term monitoring is advisable in this population. Future research should focus on enhancing the efficacy of CBT in order to improve long-term outcomes.

Keywords: body dysmorphic disorder; children; adolescents; cognitive-behavioral therapy

BODY DYSMORPHIC DISORDER (BDD) is characterized by an excessive preoccupation with perceived defects in appearance, causing significant distress and/or impairment in functioning (American Psychiatric Association, 2013). The disorder is relatively common, with an estimated prevalence of

1.7–2.4% in community samples of adults (Koran, Abujaoude, Large, & Serpe, 2008; Rief, Buhlmann, Wilhelm, Borkenhagen, & Brähler, 2006; Veale, Gledhill, Christodoulou, & Hodsoll, 2016). BDD typically has its onset during adolescence, where it can have a devastating impact on emotional, educational, and social functioning (Albertini & Phillips, 1999; Phillips et al., 2006). Moreover, adolescent-onset BDD is associated with the development of more severe symptoms, greater lifetime comorbidity, and higher rates of attempted suicide, compared with adult-onset BDD (Bjornsson et al., 2013). This highlights the urgent need for effective treatments for BDD in youth.

In adult populations, six randomized controlled trials (RCTs) have demonstrated cognitive-behavioral therapy (CBT) to be efficacious in reducing BDD severity compared with no treatment or wait-list control conditions (Rabiei, Mulkens, Kalantari, Molavi, & Bahrami, 2012; Rosen, Reiter, & Orosan, 1995; Veale et al., 1996; Wilhelm et al., 2014), supportive therapy (Enander et al., 2016), and anxiety management (Veale, Anson, et al., 2014). To date, only one RCT has evaluated CBT for BDD in youth (Mataix-Cols et al., 2015). Encouragingly, this study found that developmentally tailored CBT was efficacious compared with a control condition. The between-group effect size was 1.13, 95% CI [0.31, 1.96] at posttreatment and 0.85, 95% CI [0.02, 1.69] at 2-month follow-up, favoring the CBT intervention, which is broadly in line with the results of adult trials. Furthermore, CBT was found to be associated with significant improvements in depressive symptoms, insight, quality of life, and global functioning.

Although it is well established that CBT for BDD is associated with significant symptom relief in the short term, longer-term outcomes are less clear. A recent meta-analysis of CBT for BDD concluded that gains are likely to be maintained for a least 2–4 months following treatment (Harrison, Fernández de la Cruz, Enander, Radua, & Mataix-Cols, 2016). Existing RCTs in adults have included follow-up periods ranging from 1 (Veale, Anson, et al., 2014) to 6 months (Rabiei et al., 2012; Wilhelm et al., 2014), and have shown preservation of gains over this period. To our knowledge, only two studies have examined longer-term outcomes (McKay, 1999; Veale, Miles, & Anson, 2015). McKay (1999) found that gains were maintained at 2-year follow-up among 10 patients who had received behavior therapy with or without an additional relapse prevention program. In a larger study, Veale et al. (2015) examined outcomes among 30 patients 1–4 years after completing CBT. Overall, symptoms remained stable and the relapse rate was relatively low ($n = 4$, 13.3%).

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Clinical Trial Registration Information. Cognitive-Behaviour Therapy for Adolescents With Body Dysmorphic Disorder: <http://www.isrctn.com/ISRCTN67699666>.

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However, it is of note that 12 patients (30.8%) were on medication at the long-term follow-up and 10 (25.6%) had received further psychological treatment, which may have contributed to the positive outcomes.

Even less is known about longer-term effects of CBT for BDD in adolescents. Preliminary data from a small case series (Krebs, Turner, Heyman, & Mataix-Cols, 2012) and an open trial (Greenberg, Mothi, & Wilhelm, 2016) suggest that gains can be maintained for 6 months following treatment, but these studies have included small samples with the largest assessing only eight participants at 6-month follow-up (Greenberg et al., 2016). There is a clear need to evaluate durability of effects in the longer term and in larger samples.

The present study is a follow-up of the only RCT to date that has evaluated CBT for BDD in youth (Mataix-Cols et al., 2015). The RCT included 30 adolescents with BDD who were randomized to receive 14 sessions of CBT over 4 months or to a control condition involving written psychoeducational materials and weekly telephone monitoring for 4 months. The controlled phase of the RCT finished after a 2-month follow-up. After this time point, patients in the control condition were offered CBT. All participants continued to be assessed in a naturalistic design up to 12 months posttreatment. The current study included all participants who received CBT, regardless of the condition to which they were initially allocated. Our primary aim was to examine outcomes associated with CBT for BDD across the complete sample up to 1 year posttreatment. We hypothesized that CBT would be associated with a significant improvement in BDD symptoms and that treatment gains would be maintained up to the 12-month follow-up. The second aim was to explore the long-term effects of CBT on a range of secondary outcomes. We expected CBT to be associated with improvements in depression, insight, quality of life, and global functioning, and that participants would remain improved with respect to these outcomes at 12-month follow-up. The third and final aim was to explore possible predictors of long-term outcome, namely insight and depressive symptoms. While previous studies have not consistently found that insight and depression are reliable predictors of outcome in BDD (Harrison et al., 2016; Veale et al., 2015), these potential predictors have not been examined in adolescent samples.

Methods

PARTICIPANTS

Thirty adolescents (26 female) aged 12–18 years with a diagnosis of BDD participated in the original RCT, 26 of whom commenced a course of CBT and

were included in the current study. Participants were recruited through the National and Specialist OCD (obsessive-compulsive disorder), BDD, and Related Disorders Clinic for Young People at the Maudsley Hospital, London. Eligibility criteria for participants were as follows: (a) ages 12–18 years; (b) a diagnosis of BDD made according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association, 2000); (c) stable psychotropic medication for 12 weeks prior to randomization (if relevant); (d) no plans to commence or increase the dose of psychotropic medication (if relevant); (e) willingness to receive psychological treatment; (f) willingness/ability to travel to the clinic for CBT; and (g) a score of 24 or higher on the Yale-Brown Obsessive-Compulsive Scale Modified for BDD–Adolescent version (BDD-YBOCS-A; Phillips et al., 1997).

Exclusion criteria were (a) current or past diagnosis of schizophrenia or bipolar affective disorder, current alcohol or substance dependence, severe disabling neurological disorder, global intellectual disability, autism spectrum disorder, or an emerging borderline personality disorder requiring treatment in its own right; (b) suicidal intent that requires hospitalization; (c) English too poor to engage in treatment; and (d) characteristics interfering with completion of treatment (e.g., selective mutism). Further information about the methods of the original RCT can be found elsewhere (Mataix-Cols et al., 2015).

DESIGN

The current study was a naturalistic long-term follow-up of a sample recruited to a single-blind RCT. In the original RCT, 15 participants were randomized to receive CBT and 15 were randomized to a control group (see Mataix-Cols et al., 2015 for power calculation). The control group received written materials containing age-appropriate information about BDD (although not information pertaining to treatment of BDD), and weekly telephone calls to monitor mood and suicidal ideation. Six months after randomization, the participants in the control group were offered the opportunity to cross over to receive CBT. Participants from both arms of the original RCT were followed up 2, 6, and 12 months after completing CBT.

MEASURES

BDD diagnosis was made according to DSM-IV criteria (American Psychiatric Association, 2000) using the BDD section of the Structured Clinical Interview for DSM-IV (SCID-I; First, Spitzer, Gibbon, & Williams, 2001). Comorbid psychiatric

diagnoses were established using the child version of the Anxiety Disorders Interview Schedule (ADI-S-IV-C; Silverman & Albano, 1996). Both instruments were completed at baseline. The SCID-I BDD section was additionally administered at all subsequent time points.

Primary Outcome Measure

The BDD-YBOCS-A (Phillips et al., 1997) is a widely used 12-item semistructured clinician-administered interview that rates the severity of BDD symptoms during the past week (score range 0–48). Internal consistency in the current study was good (Cronbach's $\alpha = .79$).

Secondary Outcome Measures

Brown Assessment of Beliefs Scale (BABS; Eisen et al., 1998). The BABS is a seven-item, clinician-administered scale assessing the degree to which body-image beliefs are delusional. Total scores range from 0 to 24, with higher scores reflecting greater delusional. The BABS has shown to be a reliable and valid measure of insight/delusional in patients with BDD (Phillips, Hart, Menard, & Eisen, 2013). Cronbach's α for the current study was .82.

Appearance Anxiety Inventory (AAI; Veale, Eshkevari, et al., 2014). The AAI is a 14-item self-report measure of BDD-related cognitive and behavioral processes. The AAI has been found to have good test–retest reliability and convergent validity in the measurement of appearance anxiety. It is also sensitive to change during treatment (Veale, Anson, et al., 2014). Excellent internal consistency was demonstrated in the current study (Cronbach's $\alpha = .92$).

Cosmetic Procedures Screening Questionnaire (COPS; Veale et al., 2012). The COPS is a nine-item, self-report measure of BDD symptoms that generates a total score ranging from 0 to 72. The COPS has demonstrated good internal consistency, test–retest reliability, convergent validity, and sensitivity to change (Veale et al., 2012). Cronbach's α for the current study was .88.

Body Image Quality of Life Inventory (BIQLI; Cash & Fleming, 2002; Cash, Jakatdar, & Williams, 2004). The BIQLI is a 19-item, self-report measure of quality of life associated with body image concerns. The measure has shown good internal consistency and unidimensionality in both sexes (Cash et al., 2004). Cronbach's α for the current study was .78.

Beck Depression Inventory for Youth (BDI-Y; Beck, Beck, & Jolly, 2001). The BDI-Y is a 20-item

self-report measure of depressive symptoms, which has good internal consistency and test-criterion validity. Internal consistency in the current study was excellent (Cronbach's $\alpha = .91$).

Children's Global Assessment Scale (CGAS; Shaffer et al., 1983). The CGAS is a clinician-rated measure of global functioning that yields a single score ranging from 1 to 100. It has been found to be reliable between raters and across time and has demonstrated both discriminant and concurrent validity (Shaffer et al., 1983).

Clinical Global Impression–Severity Scale (CGI-S; Busner & Targum, 2007). The CGI-S is a clinician-rated measure of overall severity of the disorder. The CGI-S is a 7-point clinician-rated scale that is widely used in mental health treatment trials.

PROCEDURE

All participants commenced a 14-session course of manualized CBT for BDD. The core components of the treatment were psychoeducation about BDD (Sessions 1–2), exposure with response prevention (ERP; Sessions 3–12), and relapse prevention (Sessions 13–14). Additional therapeutic techniques (e.g., mirror retraining and attention training) were used when needed, as guided by the individual formulation, to promote engagement with ERP (see Mataix-Cols et al., 2015 for further details of treatment). Parents/carers were generally involved in psychoeducation sessions and in the remainder of treatment to varying degrees primarily depending on the developmental level of the young person, the extent to which parents were directly involved in accommodating BDD symptoms, and the degree to which parental involvement might inhibit disclosure/engagement with the young person. Participants were offered 1-hour CBT booster sessions 2, 6, and 12 months after completing the course of CBT. Booster sessions involved reviewing progress, setting future goals, and identifying strategies for achieving these targets.

Outcomes were assessed via clinician-rated interviews and self-report questionnaires at pre- and posttreatment and at 2-, 6- and 12-month follow-up. The BDD-YBOCS-A and the AAI were also completed at midtreatment (Session 7). Measures were administered by a trained independent assessor. In addition to the standardized measures, assessors systematically asked participants if there had been any change in psychotropic medication or if they had received further psychological treatment. They also asked participants if they desired, had sought a consultation for, and/or had undergone any cosmetic procedure.

STATISTICAL ANALYSIS

Mixed-effects regression analyses for repeated measures with maximum likelihood estimation (MLE) of parameters were implemented in Stata. Mixed-effects models use all available data, can properly account for correlation among repeated measurements on the same subject, have greater flexibility to model time effects, and can handle missing data (Gueorguieva & Krystal, 2004). For each outcome measure, the model included fixed effects of time (baseline, midtreatment [available only for the BDD-YBOCS-A and the AAI], post-treatment, and 2-, 6-, and 12-month follow-up) and

subject effects as a random intercept factor to account for the variances between participants and within participants. Within-group effect sizes for change across the baseline and the subsequent follow-up time points were calculated with Cohen's *d* (Cohen, 1988). Additionally, percentages of treatment responders and remitters were calculated at each time point. Following previous BDD research (Phillips, Hart, & Menard, 2014), treatment response was defined as a reduction $\geq 30\%$ in the BDD-YBOCS-A score. Remission was defined as loss of DSM-IV BDD diagnosis (as assessed by the SCID-I). Linear regression was used to explore

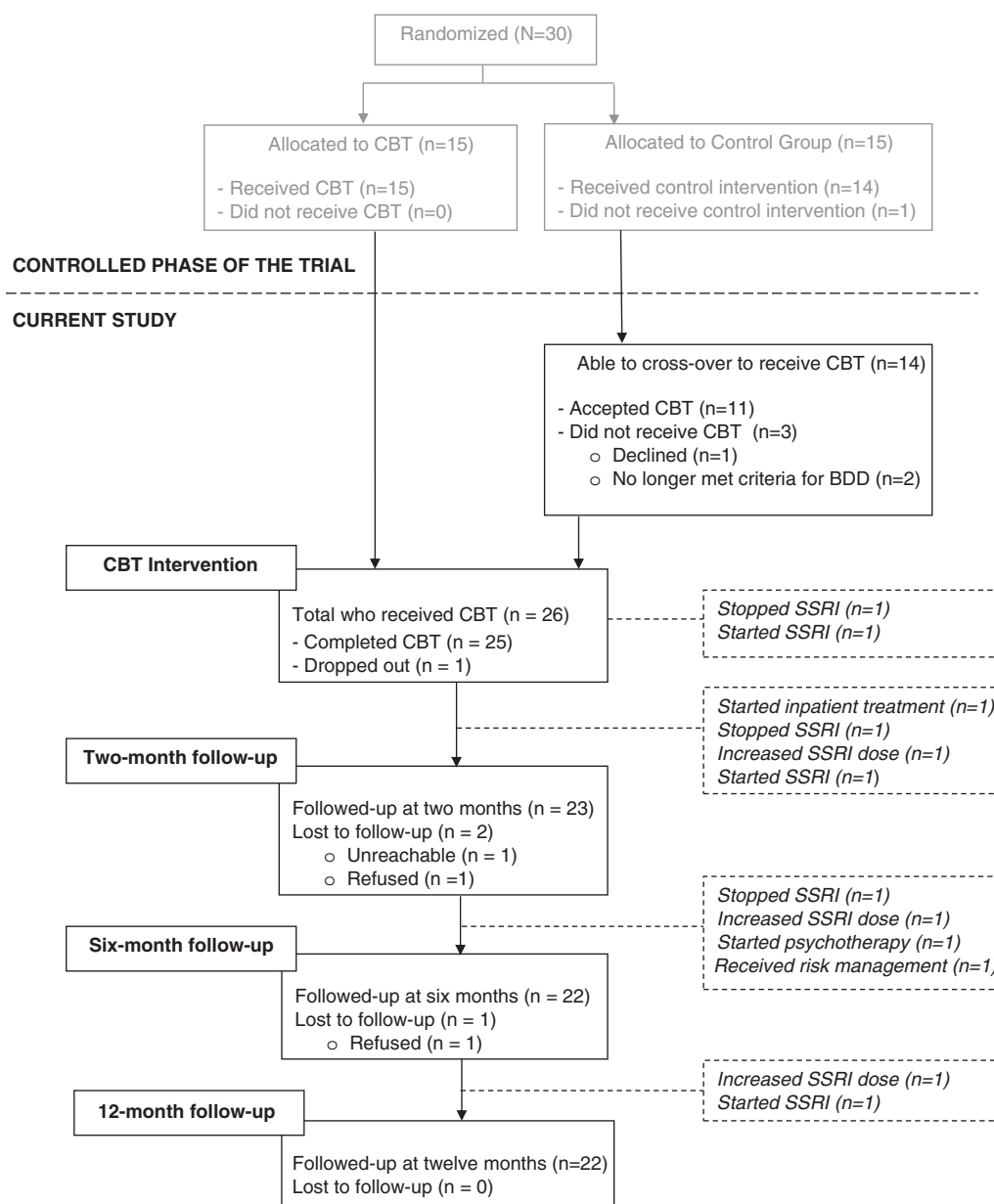


FIGURE 1 Flow diagram of study participants. *Note.* CBT = cognitive-behavioral therapy; SSRI = selective serotonin reuptake inhibitor.

whether level of insight and depressive symptoms were predictors of long-term treatment response. In this model, both baseline BABS and baseline BDI-Y scores were entered as independent variables, along with the initial BDD-YBOCS score in order to control for baseline symptom severity. The BDD-YBOCS score at 12-month follow-up was the dependent variable. Alpha (two-tailed) was set at $p < 0.05$ for all analyses.

Results

PARTICIPANTS

Figure 1 shows the number of participants recruited and followed up. Of the 15 participants initially randomized to the control condition, one dropped out immediately after randomization, two no longer met diagnostic criteria for BDD after 6 months and did not cross over to receive CBT, and one declined CBT. Therefore, a total of 11 participants from the control condition crossed over to receive CBT. All participants initially randomized to the CBT arm ($n = 15$) accepted treatment, meaning that a total 26 adolescents commenced CBT. Of those, 25 participants completed a course of CBT, 23 completed 2-month follow-up assessments, and 22 completed 6- and 12-month follow-ups. There were no differences in demographic or clinical characteristics between those who were followed up to 12 months ($n = 22$) versus those who dropped out ($n = 4$).

In the final sample ($n = 26$), the majority of participants were female ($n = 22$, 84.6%) with a mean age of 16.2 ($SD = 1.6$) and a mean age of onset of BDD of 12.5 ($SD = 1.7$). Most participants were White ($n = 22$, 84.6%), and the most common appearance concerns were facial features ($n = 12$, 46.2%), skin ($n = 4$, 15.4%), and hair ($n = 3$, 11.5%). Over half of the participants ($n = 14$,

53.8%) had delusional insight into their perceived defect (defined as a total BABS score ≥ 18 and a score of 4 on the first item, indicating complete conviction in their belief; Phillips et al., 2012). Half of the sample ($n = 13$, 50.0%) wanted surgery to correct their perceived defects at baseline.

Ten participants (38.5%) had previously received CBT for BDD and 10 (38.5%) had had a trial of one or more selective serotonin reuptake inhibitor (SSRI). Five participants (19.2%) continued to take an SSRI when they started CBT. The majority ($n = 16$, 61.5%) were not attending school or attending sporadically due to BDD. Twelve participants (46.2%) had current or past self-harm, and four (15.4%) had previously attempted suicide. Twenty participants (76.9%) met diagnostic criteria for at least one additional psychiatric disorder. The most common comorbidities were mood disorders (major depressive disorder or dysthymia; $n = 10$, 38.5%) and social phobia ($n = 9$, 34.6%).

PRIMARY OUTCOME

Estimated mean BDD-YBOCS-A scores and standard errors (*SEs*) from the mixed-effects model for each time point are shown in Table 1 (for raw means and *SDs*, see Supplementary Table A1). The linear mixed-effect regression model revealed that there was a significant effect of time at all time points, compared with baseline, indicating that symptoms remained improved throughout follow-up (see Table 2 and Figure 2). Within-group effect sizes for the BDD-YBOCS-A with respect to the baseline scores increased nonsignificantly from 1.31 at posttreatment to 1.70 at 12-month follow-up (see Table 3).

Pairwise comparisons between the different time points revealed that there was a significant decrease in the BDD-YBOCS-A scores during the course of

Table 1
Model Estimates Across Time Points for Each Outcome Measure From the Linear Mixed-Effects Models

Measures	Baseline		Midtreatment (Session 7)		Posttreatment (Session 14)		2-month follow-up		6-month follow-up		12-month follow-up	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
BDD-YBOCS-A	36.96	1.97	31.2	1.99	25.70	2.02	26.50	2.04	24.12	2.10	22.23	2.07
AAI	38.20	2.75	32.4	2.75	22.33	2.84	23.41	2.91	24.37	2.99	25.30	3.14
BABS	18.71	1.23	—	—	13.94	1.27	16.37	1.27	16.33	1.30	15.33	1.28
COPS	56.96	3.53	—	—	39.67	3.73	40.93	3.84	40.87	3.95	41.04	4.02
BIQLI	-30.95	3.67	—	—	-16.21	3.86	-21.05	4.00	-21.37	4.07	-21.80	4.34
BDI-Y	68.04	2.81	—	—	57.56	2.96	60.70	3.00	62.19	3.08	61.45	3.19
CGAS	40.15	2.52	—	—	50.60	2.66	51.05	2.63	53.72	2.66	57.13	2.69
CGI-S	4.77	0.25	—	—	3.47	0.26	3.58	0.26	3.68	0.26	3.44	0.27

Note. BDD-YBOCS-A = Yale-Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder–Adolescent version; AAI = Appearance Anxiety Inventory; BABS = Brown Assessment of Beliefs Scale; COPS = Cosmetic Procedures Screening Questionnaire; BIQLI = Body Image Quality of Life Inventory; BDI-Y = Beck Depression Inventory–Youth; CGAS = Children's Global Assessment Scale; CGI-S = Clinical Global Impression–Severity.

Table 2
Results of the Time Effects Across Time Points for Each Outcome Measure From the Linear Mixed-Effects Models

Measures	Coefficient (95% CIs)				
	Baseline to midtreatment (Session 7) outcomes	Baseline to posttreatment (Session 14) outcomes	Baseline to 2-month follow-up outcomes	Baseline to 6-month follow-up outcomes	Baseline to 12-month follow-up outcomes
BDD-YBOCS-A	-5.70 (-9.46 to -1.94)**	-11.26 (-15.07 to -7.44)***	-11.50 (-15.37 to -7.64)***	-12.82 (-16.80 to -8.84)***	-14.72 (-18.64 to -10.80)***
AAI	-5.76 (-10.39 to -1.13)*	-15.87 (-20.72 to -11.03)***	-14.79 (-19.79 to -9.79)***	-13.83 (-19.01 to -8.66)***	-12.90 (-18.41 to -7.39)***
BABS	—	-4.78 (-7.01 to -2.54)***	-2.34 (-4.58 to -0.11)*	-2.38 (-4.67 to -0.10)*	-3.38 (-5.63 to -1.13)**
COPS	—	-17.29 (-23.73 to -10.84)***	-16.03 (-22.70 to -9.35)***	-16.09 (-23.01 to -9.17)***	-15.92 (-22.99 to -8.85)***
BIQLI	—	14.74 (7.26 to 22.23)***	9.90 (2.20 to 17.60)*	9.58 (1.67 to 17.49)*	9.15 (0.76 to 17.53)*
BDI-Y	—	-10.48 (-15.59 to -5.38)***	-7.34 (-12.52 to -2.15)**	-5.85 (-11.23 to -0.48)*	-6.59 (-12.19 to -0.99)*
CGAS	—	10.44 (5.69 to 15.20)***	10.89 (6.21 to 15.58)***	13.56 (8.80 to 18.32)***	16.97 (12.15 to 21.80)***
CGI-S	—	-1.30 (-1.80 to -0.80)***	-1.19 (-1.70 to -0.68)***	-1.09 (-1.59 to -0.58)***	-1.33 (-1.85 to -0.82)***

Note. BDD-YBOCS-A = Yale-Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder—Adolescent version; AAI = Appearance Anxiety Inventory; BABS = Brown Assessment of Beliefs Scale; COPS = Cosmetic Procedures Screening Questionnaire; BIQLI = Body Image Quality of Life Inventory; BDI-Y = Beck Depression Inventory—Youth; CGAS = Children's Global Assessment Scale; CGI-S = Clinical Global Impression—Severity.

***, $p < .001$, ** $p < .01$, * $p < .05$.

the active treatment (from pretreatment to midtreatment: estimated mean difference = -5.70 , 95% CI $[-9.46, -1.94]$, $SE = 1.92$, $p = .003$), and from midtreatment to posttreatment (estimated mean difference = -5.57 , 95% CI $[-9.40, -1.73]$, $SE = 1.95$, $p = .004$), but no further significant change thereafter (all $p > .05$), indicating that the BDD symptoms remained stable during the follow-up.

Nine out of 26 participants (34.6%) were classified as responders at posttreatment. This number increased to 10 (38.5%) at 2- and 6-month follow-up, and to 13 (50.0%) at 12-month follow-up. Five participants (19.2%) were classified as remitters at posttreatment and at 2-month follow-up, and six participants (23.1%) at 6- and 12-month follow-up.

SECONDARY OUTCOMES

Table 1 shows the estimated means and SE for all of the secondary outcome measures at each time point (raw means and SD are shown in Supplementary Table A1). The results of the linear mixed-effect regression models for the secondary outcomes are shown in Table 2. The results demonstrate significant improvements across all measures at each time point, relative to baseline. Within-group effect sizes across time points for all secondary outcome measures are shown in Table 3.

INSIGHT AND DEPRESSIVE SYMPTOMS AS PREDICTORS OF TREATMENT RESPONSE

Results of a linear regression model indicated that neither baseline BABS nor baseline BDI-Y scores significantly predicted treatment response at 12-month follow-up (baseline BABS: $\beta = .094$, $SE = .654$, $p = .730$; baseline BDI-Y: $\beta = .303$, $SE = .285$, $p = .241$).

PROTOCOL DEVIATIONS

A number of participants changed, obtained, or stopped treatment off protocol (see Figure 1). One participant commenced fluoxetine (40 mg) before Session 7 and then started additional CBT for BDD as an inpatient after posttreatment, following a suicide attempt. Two other participants commenced medication: one between posttreatment and 2-month follow-up (40 mg fluoxetine), and one between 6- and 12-month follow-up (100 mg sertraline). An additional three participants increased medication: one between posttreatment and 2-month follow-up (from 20 to 30 mg fluoxetine), one between 2- and 6-month follow-up (from 50 to 100 mg sertraline), and one between 6- and 12-month follow-up (from 100 to 150 mg sertraline). Three participants discontinued SSRI medication: one during active treatment, one between posttreatment and 2-month follow-up,

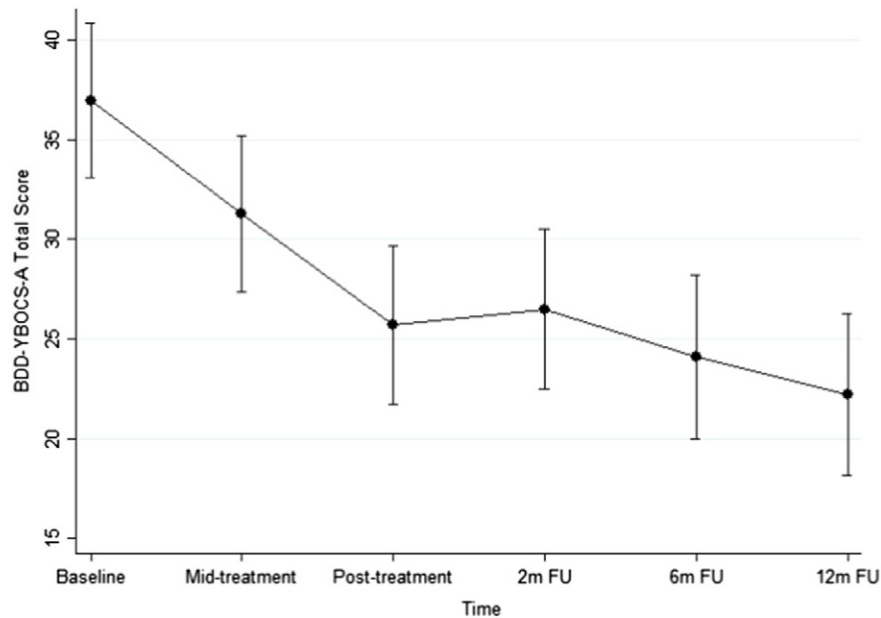


FIGURE 2 Time effects on the primary outcome measure (BDD-YBOCS-A), derived from the mixed-effects regression model. Error bars indicate 95% confidence intervals. *Note.* BDD-YBOCS-A = Yale-Brown Obsessive-Compulsive Scale Modified for BDD-Adolescent version; 2m FU = 2-month follow-up; 6m FU = 6-month follow-up; 12m FU = 12-month follow-up.

and one between 2- and 6-month follow-up. One further patient commenced psychotherapy for depression between 2- and 6-month follow-up and one received ongoing risk management after 2-month follow-up following a suicide attempt. Analyses were repeated excluding all data points after treatment changes for these participants; results remained largely unchanged (see Supplementary Tables A2 and A3).

ADVERSE EVENTS

Two participants attempted suicide during the study. In one case, the attempt occurred during the controlled phase of the trial as previously reported (Mataix-Cols et al., 2015). The other case attempted suicide on two separate occasions between the 2- and the 6-month follow-ups. On both occasions, the patient took an overdose of

Table 3
Within-Group Cohen's *d* Effect Sizes From Baseline to Each Follow-Up Time Point

Measures	Within-group Cohen's <i>d</i> (95% CI)				
	Baseline to midtreatment (Session 7) outcomes	Baseline to posttreatment (Session 14) outcomes	Baseline to 2-month follow-up outcomes	Baseline to 6-month follow-up outcomes	Baseline to 12-month follow-up outcomes
BDD-YBOCS-A	0.86 (0.28 to 1.43)	1.31 (0.69 to 1.92)	1.27 (0.65 to 1.89)	1.50 (0.84 to 2.15)	1.70 (1.03 to 2.36)
AAI	0.44 (-0.11 to 1.00)	1.25 (0.61 to 1.87)	1.12 (0.48 to 1.75)	1.19 (0.52 to 1.84)	1.22 (0.51 to 1.91)
BABS	—	0.85 (0.26 to 1.44)	0.45 (-0.12 to 1.02)	0.42 (-0.17 to 1.01)	0.54 (-0.04 to 1.12)
COPS	—	1.05 (0.43 to 1.67)	0.94 (0.31 to 1.57)	1.18 (0.50 to 1.84)	0.99 (0.32 to 1.64)
BIQLI	—	-0.80 (-1.42 to -0.17)	-0.59 (-1.22 to 0.04)	-0.59 (-1.23 to 0.05)	-0.61 (-1.28 to 0.07)
BDI-Y	—	0.75 (0.15 to 1.35)	0.54 (-0.06 to 1.14)	0.54 (-0.08 to 1.15)	0.67 (0.02 to 1.31)
CGAS	—	-1.00 (-1.60 to -0.39)	-1.10 (-1.69 to -0.49)	-1.15 (-1.75 to -0.53)	-1.38 (-2.01 to -0.73)
CGI-S	—	1.22 (0.60 to 1.83)	1.01 (0.41 to 1.61)	0.98 (0.37 to 1.57)	1.13 (0.50 to 1.74)

Note. BDD-YBOCS-A = Yale-Brown Obsessive-Compulsive Scale Modified for Body Dysmorphic Disorder-Adolescent version; AAI = Appearance Anxiety Inventory; BABS = Brown Assessment of Beliefs Scale; COPS = Cosmetic Procedures Screening Questionnaire; BIQLI = Body Image Quality of Life Inventory; BDI-Y = Beck Depression Inventory-Youth; CGAS = Children's Global Assessment Scale; CGI-S = Clinical Global Impression-Severity.

medication, the first of which required emergency treatment in the hospital. The participant remained in the trial and completed a 12-month follow-up assessment, but also received ongoing risk management from the local Child and Adolescent Mental Health Service.

OTHER SIGNIFICANT EVENTS

Of the 22 patients who completed a 12-month follow-up assessment, six (27%) continued to want cosmetic treatment (compared with 13 [50%] at baseline), five (23%) of whom had sought consultations for one or more procedure during follow-up (rhinoplasty, $n = 2$; breast augmentation, $n = 2$; blepharoplasty, $n = 1$; liposuction, $n = 1$; lip fillers, $n = 1$; Botox, $n = 1$). Of these five participants, none had achieved a full remission from BDD and only one was classified as a treatment responder at 12-month follow-up. There was no difference in baseline BABS scores between those who did and did not want surgery at 12-month follow-up ($M = 20.9$ and $M = 18.9$, respectively; $t = -1.04$, $p = .31$), nor was there any difference in baseline BDI-Y scores ($M = 73.57$ and $M = 67.06$, respectively; $t = -1.72$, $p = .10$). By 12-month follow-up, no participants had undergone cosmetic procedures or had concrete plans in place to do so.

Three participants (13.6% of female participants; ages 14, 17, and 18 years) reported unplanned pregnancies—one during the course of CBT and two during follow-up. In two cases, pregnancies resulted from one-off sexual encounters that took place under the influence of alcohol, and the pregnancies were perceived negatively by the patients and were terminated. In the third case, the patient was in a long-term relationship and the pregnancy was perceived positively.

Discussion

To our knowledge, the current study represents the largest evaluation of CBT for adolescents with BDD to date. Moreover, this is the first study to examine longer-term outcomes in youth. In line with our primary hypothesis, CBT was found to be associated with a significant reduction in BDD symptoms and gains were maintained through to 12-month follow-up. Within-group effect sizes were large and increased nonsignificantly from 1.31 at posttreatment to 1.70 at 12-month follow-up. Participants received a total of three booster CBT sessions over the 12-month follow-up and therefore maintenance of gains was achieved with a low level of therapist input. Although a number of patients ($n = 6$, 23%) received further treatment for BDD off protocol during the follow-up period, this does not account for our findings as the results remained largely

unchanged after excluding these patients from the analyses. Regarding individual outcomes, the number of patients classified as treatment responders increased from 35% at posttreatment to 50% at 12-month follow-up, indicating that some patients made further gains during follow-up, perhaps as they continued to utilize CBT strategies.

With respect to our second hypothesis, improvements were observed on all secondary outcome measures (including depressive symptoms, insight, quality of life, and global functioning) at 12-month follow-up, relative to baseline, suggesting that CBT for BDD is associated with long-term benefits across a number of domains. In relation to the final aim, neither baseline levels of insight nor depressive symptoms predicted BDD symptom severity at 12-month follow-up. Although this is inconsistent with the clinical suggestion that BDD patients with poor insight and depression are difficult to treat, it is nevertheless in line with the recent meta-analytic finding that these factors do not predict CBT response (Harrison et al., 2016). Further research in larger samples is needed to identify significant predictors and moderators of CBT response, as this could inform clinical decision making and the development of more effective interventions.

The improvements associated with CBT reported here are comparable to those seen in previous RCTs (Enander et al., 2016; Mataix-Cols et al., 2015; Rabiei et al., 2012; Rosen et al., 1995; Veale, Anson, et al., 2014; Veale et al., 1996; Wilhelm et al., 2014). Our finding that gains are maintained for a year following treatment extends previous findings in adolescents that have shown, in small samples, that gains can be preserved for up to 6 months (Greenberg et al., 2016). Our results are in line with the adult literature demonstrating maintenance of gains for up to 4 years (Veale et al., 2015). The results of the current study must be interpreted cautiously due to the lack of control condition, but they suggest that developmentally tailored CBT is an effective treatment for adolescent BDD in the longer term, supporting the National Institute for Health and Clinical Excellence (2005) guidelines.

Although our findings are encouraging, it must be noted that by 12-month follow-up only half of the sample could be classified as treatment responders. Furthermore, two participants (8%) attempted suicide, consistent with previous research demonstrating high rates of suicidality among adolescents with BDD (Bjornsson et al., 2013). In addition, while there was a marked reduction in the number of adolescents wanting cosmetic treatments for their perceived appearance

defects relative to baseline, nevertheless five patients sought consultations for cosmetic procedures by 12-month follow-up (all of whom still met diagnostic criteria for BDD). This is concerning given that cosmetic treatment is frequently associated with negative outcomes in BDD (Bowyer, Krebs, Mataix-Cols, Veale, & Monzani, 2016). It is possible that BDD patients are at particular risk of seeking cosmetic surgery after failing to respond to CBT, as failure of a psychological approach may strengthen their view that physically changing their appearance is the only solution to their difficulties. Also of note, three participants reported unplanned pregnancies during follow-up. In two instances, the pregnancies resulted from one-off sexual encounters while under the influence of alcohol. The clinical impression was that these patients were vulnerable to such encounters due to their strong desire for social acceptance, low self-esteem, and social naïvety, all of which were directly related to their BDD. Future research should examine possible methods for enhancing outcomes in youth with BDD, such as delivering more CBT sessions (Veale, Anson, et al., 2014; Wilhelm et al., 2014) and/or combining CBT with pharmacotherapy as recommended by clinical guidelines (National Institute for Health and Clinical Excellence, 2005).

The results of this study should be considered within the context of a number of limitations. First, this represents a naturalistic follow-up of an RCT. The absence of a control group means that we cannot conclude that long-term improvements in BDD symptoms and secondary outcomes were an effect of CBT. Second, the sample size was too small to enable us to examine a comprehensive set of potential moderators of treatment response (e.g., comorbidities, age of BDD onset, chronicity). Third, the study included a relatively severe sample of adolescents with BDD (mean baseline BDD-YBOCS-A of 37). The majority of patients were highly functionally impaired (e.g., unable to attend school full-time) and almost half had been nonresponsive to previous attempts at CBT or pharmacotherapy. It is possible that superior results would be obtained in a less severe sample. Fourth, despite best efforts, there were a number of protocol deviations, with 11 patients changing or obtaining treatment off protocol. Fifth, outcomes were assessed by a single rater only, meaning that we were unable to demonstrate interrater reliability.

In summary, the current study suggests that developmentally tailored CBT is associated with significant improvements in BDD symptoms among adolescents, and that gains are maintained for the year following completion of treatment with minimal therapist input. The long-term effects of

CBT for adolescent BDD require further evaluation using even longer follow-up periods. Future studies should seek to identify predictors and moderators of long-term outcome in an effort to understand barriers to recovery. Our findings suggest that a significant proportion of adolescents who receive CBT for BDD continue to experience clinically significant symptoms in the longer term, and remain vulnerable to a range of potential risks and negative outcomes (e.g., cosmetic surgery, suicidal behavior, risky sexual behaviors). For this reason, we recommend long-term monitoring of these patients. Efforts must be focused on better understanding the etiological and maintenance factors associated with this disorder in order to improve upon existing CBT interventions, and enhance long-term prognosis.

Conflict of Interest Statement

The authors declare that there are no conflicts of interest.

Appendix A. Supplementary Data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.beth.2017.01.001>.

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